

A PROCEDURAL MANUAL
FOR DIAGNOSTIC STUDIES

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A PROCEDURAL MANUAL
FOR CONDUCTING DIAGNOSTIC STUDIES
OF HIGHWAY COMMUNICATION SYSTEMS

1.0 INTRODUCTION

The highway system in this country has been designed to provide the motorist with sufficient information to complete his trip in a safe and efficient manner. Standards have been developed to assist the designer in accomplishing this goal. Often, however, the installation in the field fails to provide the desired result.

The failure of a system specifically designed to meet the needs of the driver has been attributed to a vast number of interacting factors. The difficulty of visualizing a three-dimensional, finished facility during the design process, as well as differences in interpretation of the existing standards, have been identified as the primary reasons for failure of the information system on newer facilities. Maintenance of the system and modification of the system without adequate consideration of the effects of modification on the operation of the system appear to be the primary considerations in the degradation of the information system on older facilities. The communication system which exists is a culmination of the design, construction, operation, and maintenance policies and practices of the responsible agency.

For these reasons, field evaluation of the communication systems is probably the only practical method to insure that all points of view are considered and their effects evaluated.

2.0 DIAGNOSTIC EVALUATION AS A TOOL

The diagnostic evaluation technique should be approached with considerable caution. It is not a "cure-all" for the problems which face the highway and traffic engineer. However, it can be a very useful tool if approached in an objective manner.

"Diagnostic evaluation" literally means "a detailed examination of a case based on the facts as they actually exist in the field." Therefore, the results obtained through diagnostic studies apply only to the specific combination of circumstances observed. The generalization of the results of diagnostic evaluation based on only one study is difficult, if not altogether impossible. Generalization is possible only after similar patterns have been identified in several studies. This implies that diagnostic studies will be conducted in a systematic manner and that the review process will be dynamic in nature. That is, the process includes the planning, design, and operation of the facility. Thus, the conceptual framework of the diagnostic evaluation procedure must include all three levels.

A "Communications Systems Evaluation Task Force" is suggested as a means to integrate effectively the results of the diagnostic evaluation into the design process. Figure 1 presents the suggested approach to "engineering" roadway communication and the suggested functions of the task force.

A SUGGESTED APPROACH FOR
ENGINEERING ROADWAY COMMUNICATION

COMMUNICATIONS SYSTEMS
EVALUATION TASK FORCE

SUGGESTED FUNCTIONS

EXAMINE OR EVALUATE
THE EFFECTIVENESS OF
PRESENT PRACTICES AS
REPRESENTED BY
EXISTING SYSTEMS

EVALUATE THE
COMMUNICATION
SYSTEMS FOR
PLANNED FACILITIES

EXAMINE THE
CURRENT COMMUNICATION
SYSTEMS STANDARDS
AND POLICIES

FIGURE 1

Function I: Examine or Evaluate the Effectiveness of Present Practices
As Represented by Existing Systems

Rowan, et al. (1) have shown that a wide variety of features has an effect on how well the roadway communicates with the driver. These features are created or located through the individual processes of design, construction, operation, and maintenance. The creation of a three-dimensional driving environment involves a number of "trade-offs." Many of these do have an effect on the roadway communication system.

Roadway communication systems are a complex of features of which the signing is only one small part. Geometric features have been found to be more significant than signing in many instances and are major contributors to the effectiveness of the signing. This study has demonstrated that the totally integrated roadway communication system must be engineered to insure a proper balance of the "trade-offs" between each of the design elements.

The planning and design stages of project development are the logical points for an engineering evaluation of the "trade-offs" involved in the design, construction, operation and maintenance of the many features of the roadway which together constitute the roadway communication system. These "trade-offs" must be considered in light of the driver's need for information, his safety, and his comfort while operating on the facility.

Research findings also indicate that most of the necessary improvements in the system can be brought about within present policies and criteria through an engineering examination of the system from the viewpoint of that which the driver expects and that which the designer wants him to "expect." Using the guidelines developed from this project, a specialized team or task force could develop the expertise to evaluate the effectiveness of the communication system of highway segments and to recommend improvements for those systems.

Stated in different terms, research has shown that roadway communications must be engineered, and the engineer must in some fashion integrate the various criteria, standards, and policies into effective practices. It is unlikely that this can be accomplished satisfactorily by the creation of another overall set of criteria, standards, and policies.

Function II: Evaluate the Communication Systems Planned for New Facilities

The evaluation of plans for new facilities is more difficult than the evaluation of existing facilities due to the problems encountered in visualizing the three-dimensional roadway environment. To facilitate this evaluation, a set of guidelines (i.e., design standards) for treatment of the common situations is required. The findings of the project reported by Rowan et al. (1) indicate that judicious application of the existing standards would result in considerable improvement of the driver communication system, provided these standards are not so rigidly enforced as to limit the designer's capability to handle unusual situations.

During the process of evaluating existing roadway segments, the suggested task force could undoubtedly develop the skill to visualize proposed facilities in three dimensions. Also, these individuals would probably develop additional guidelines and suggestions for use by the designer, the traffic engineer, the maintenance engineer, as well as other appropriate personnel.

Function III: Examine the Current Communication System Standards and Policies

Relatively few policies or standards are always bad. Under certain circumstances, application or interpretation of the policies and standards pertinent to traffic control may not be appropriate for the geometrics; thus, a communication system may result which is less effective than is desirable (i.e., does not fully meet the needs of the driver).

The Communication Systems Evaluation Task Force will undoubtedly uncover many situations in their day-to-day operation which could be effectively handled by minor changes in the existing policies and standards. The task force would provide for the continued updating of the standards and a review of the application of these standards.

For the instances in which the policies and standards should be changed, a single state will find it difficult to bring about such change. The various state "task forces," working together, could jointly recommend changes or needed research to facilitate change. This pool of expertise to accomplish day-to-day tasks will also be of extreme value.

Since each organization accomplishes its objectives in a different way, it is probably inappropriate to suggest a single operational procedure for accomplishing any particular task. It is hoped that the task force would suggest one or more alternative procedures to create or to "engineer" a totally integrated roadway communication system.

3.0 PLANNING FOR DIAGNOSTIC STUDIES

Recording the Interview

It is desirable, although not essential, to tape record the interview with the subject as a permanent record of the interview. This is also to insure that comments which seem trivial at the time of the interview, but later take on significance, are not lost. High quality, portable recording equipment is readily available at an approximate cost of 60 dollars.

The primary disadvantage to recording the interview is the time required to reduce the tapes, which is approximately four hours for each 30-minute interview. A relatively high percentage of the material recorded will be of little, if any, value. Thus, to obtain the advantages listed above, a considerable expenditure of time is required. The most significant points from the interview can be manually recorded by the interviewer and will also be provided on the diagnostic questionnaire.

The Use of a Questionnaire

The key to successful use of the diagnostic evaluation procedure on a broad basis is the identification of problems which occur repeatedly and which can be corrected through changes in policy or operating procedures. Certainly the problems identified at the study site are significant and should be corrected; however, it is highly desirable to extend this knowledge to the general situation. To facilitate the study

and to insure a reasonable degree of uniformity between studies, the use of a questionnaire is desirable.

To be most effective, each item on the questionnaire should remind the team member of a specific area on which a response is desired. Thus, the questionnaire should be developed to probe all the areas which can be expected to produce problems for the driver on each type of facility. Typical questionnaires for diagnostic studies are provided in the appendix.

Selection of the Interviewer

The results of any interview-oriented activity depend rather heavily upon the ability of the interviewer to direct the dialogue along productive lines. The interviewer should be an extrovert with the ability to converse easily with strangers. A thorough working knowledge of highway design and traffic control concepts is a necessary quality so that the interviewer can respond quickly and effectively to specific events, creating a situation which results in an overt move on the part of the subject driver.

In addition to these qualities, the interviewer must attempt to be objective in his conduct of the interview. Many individuals with an outgoing personality are also rather rigid in their approach to problems. Care should be exercised to insure that the individuals selected at least have the ability to approach problems objectively.

Selection of the Study Site

General Considerations

The selection of the study site is another vital aspect of the diagnostic evaluation procedure. Any section of highway can be studied. However, to gain the greatest benefit from the study, the study site should typify highway sections in the local area. The results of the study can thus be generally applied to many different situations. The specific requirements of the site will depend upon the objectives of the individual study. Three examples of possible study objectives are as follows:

1. To study existing standards as applied to a new section of highway;
2. To study the effects of time on the communication system;
3. To study route continuity through an urban area.

Length of the Study Section

The length of the study section will be determined by the physical characteristics of the highway and the safe operating speeds which exist. Experience indicates that the productivity of the interview decreases very rapidly after about 20 minutes. Considering the amount of time required to reduce the tapes, 20 minutes appears to be a reasonable maximum length of driving run. Conversely, runs of less than 10 minutes duration generally do not include a sufficient length of highway to

provide a cross section of the problems which might exist. Therefore, selection of the routes should provide an overall driving time of between 15 and 20 minutes. Should the situation require a total driving time of 30 minutes or more, consideration should be given to the testing of one subject on the outbound portion of the run and another one on the return portion.

Adaptation of the Subject

The subject will often be asked to drive a vehicle other than his own. For this reason, a short period of time will be required for him to adjust to the vehicle. The interview procedure may also be somewhat disconcerting to the subject. For these reasons, a short span of time should be allowed at the beginning of each route for adaptation of the subject. Three to five minutes appears sufficient for this adjustment and can be included in the 20-minute driving time. It is important to exclude those major areas in which problems are likely to occur in the first few minutes of the driving run. The driving routes selected should include exits from the basic study section and entrances back to the facility by way of the local roadway system.

Selection of the Subjects

Personality Traits of Subjects

The subjects, like the interviewers, should be extroverts with a genuine interest in the problems of driving. The subjects must be willing to participate and to criticize those items which are the

responsibility of their particular superior. For this reason, the subjects normally should not come from the agency responsible for the conduct of the study.

An attempt should be made to select persons who are perceptive of their situation. This trait increases the probability that the subject will be able to recognize the sources of any difficulty he may encounter.

Composition of the Diagnostic Team

The composition of the diagnostic team should reflect the broad spectrum of drivers that can be expected to use a public roadway. As a general guideline, the following composition is desirable:

1. A representative of local law enforcement agency
2. An individual with a traffic engineering or design background
3. An administrator in the jurisdiction responsible for the roadway section under investigation
4. A professional driver (truck, taxi, bus, etc.)
5. Two women lay drivers
6. Two men lay drivers

Various organizations and agencies within the local community can usually provide subject drivers for the diagnostic teams. For example, individuals in the latter three categories might be available from the local trucker or taxi driver union, citizen's traffic safety commissions, women's clubs, Chambers of Commerce, or civic and service organizations. In addition, secretarial personnel from the various agencies involved in

the study can serve as women lay drivers. However, the subject should not be directly responsible to the individual responsible for traffic control. Driver education instructors should be considered lay drivers for purposes of the diagnostic team composition.

Visual Examination of Team Members

It was found that visual examinations of each diagnostic team member are not necessary to determine driving capability. Possession of a valid driver's license appears to serve this purpose very well. A visual examination would only be necessary to detect those defects in subject drivers which would significantly affect the results of the study, and such cases do not occur frequently.

Driving Experience of Subjects

The driving experience of subject team members should be rather extensive. Certainly each should have driven outside the local area in which the study is being conducted. Conversely, the study section should not be part of a route which the subject uses on a daily basis. Repeat drivers soon learn to navigate a section of roadway by landmarks and are able to completely ignore the formal communication system.

Vehicles for the Studies

The vehicles for the diagnostic studies generally consist of rental vehicles to avoid problems of legal liability. The use of the team member's own vehicle for the study is possible but usually requires that the subject be reimbursed for the cost involved. This also will substantially

increase the time needed to conduct the study if the interview is to be taped. The use of publicly-owned vehicles is usually legally restricted to public employees and frequently to employees of specific agencies. If publicly-owned vehicles are to be used, special attention to the liability requirements is mandatory.

4.0 CONDUCTING THE STUDY

Preparation of the Subject

The subject driver must be prepared for the study activities prior to the interviews. Team members frequently have a distorted view of the objectives of diagnostic studies and rarely have an understanding of the broad scope of the investigation. The subject drivers should be called together for the purpose of discussing with them the objectives of the study and should be asked to read the questions to which they will be expected to respond. This preparation will also help to put the subjects at ease.

Subject Adjustment to Vehicle

Each team member will be required to make adjustments to the test vehicle. The subject driver should be reminded to check seat adjustment and mirror position. The interviewer should locate the primary controls for the subject: ignition, windshield wiper, etc., and suggest that the subject test the brakes before beginning the driving run. THE INTERVIEWER MUST NOT ASSUME THAT THE SUBJECT DRIVER IS FAMILIAR WITH THE VEHICLE.

Conducting the Interview

The key to a good interview is the team member's conversation throughout the driving run. The preparation of the subject will set the stage for the interview, and the various elements of the roadway and communication system will provide the material for the discussion. In spite of this, there will be occasions during which long lags in the conversation will occur. The interviewer should have a series of general questions prepared on a small card which can be used to steer the conversation into potentially productive subject areas.

The first item in the interview process is an attempt to put the subject at ease and to gain his confidence. This can be accomplished by the interviewer's asking questions which are very familiar to the team member. "What is your name and occupation?" "About how many miles per year do you drive?" "How frequently do you drive out of state?" These and similar questions are easily answered by the subject drivers and give them experience in the interview process.

The subject driver should be encouraged to volunteer information, and when a noticeable reaction occurs he should be questioned as to the cause of the overt movement. As long as the team member volunteers information there is no need for the interviewer to interfere. Should the information become trivial, the interviewer can redirect the discussion along more productive lines. The use of prepared questions will insure that a minimum of nonproductive time will lapse.

Following the driving phase of the interview, a brief "wrapup," or summary of the more significant points made during the interview is desirable. This permits the subject the opportunity to add any observations which he failed to make previously and insures that the interviewer has a complete grasp of the team member's intended meaning for each comment. At the conclusion of the "wrapup," the interviewer should thank the subject for his contributions to the study and suggest that he complete the questionnaire prior to a discussion of his observations with the other subjects.

Review and Discussion Session

The review and discussion session constitutes a very significant aspect of the diagnostic study. These sessions give the subject drivers an opportunity to actively participate by exchanging ideas and conflicting viewpoints.

It is the responsibility of the discussion leader to provide continuity to the session by outlining and grouping the more significant points from the interviews. This is to assure that none of the important topics is overlooked in the discussion session with team members.

The review session has a very real public relations benefit. It provides an opportunity for the engineer to explain to the layman why some of the recommendations which appear so logical to him cannot be implemented and also allows the engineer to discuss his viewpoints with several drivers at the same time.

5.0 DATA REDUCTION AND ANALYSIS

The reduction of the interview material is a long and time-consuming process, particularly when the interview is tape recorded. The decision as to relevant comments should be made by an individual with an engineering background. This is usually impractical due to the time required. In addition, non-technical personnel must be utilized to the maximum degree possible. Thus, a literal transcription of the entire interview and a grouping of the responses to each item on the questionnaire can be accomplished by secretarial-clerical personnel. The engineer can then disregard the non-relevant portions and prepare a report of the study in a minimum of time.

6.0 A PROCEDURE FOR CONDUCTING DIAGNOSTIC STUDIES

1. Select Objective Of Study

- a) Route continuity
- b) Interchange signing
- c) Effectiveness of maintenance work
- d) Evaluation of special control

2. Decide on Methodology

<u>Method of Data Recording</u>	<u>Determinants of Study</u>
a) Questionnaire(s)	a) Number of subjects
b) Tape recording	b) One-way or two-way driving runs
c) Review session	

3. Prepare Necessary Equipment and Questionnaires

<u>Tape Record</u>	<u>Questionnaire</u>
a) Recorder	a) Develop questionnaire
b) Batteries	b) Use standard questionnaire
c) Tapes	
d) Microphones and cable	

4. Select Site

- a) Consideration of study objective
- b) Representative of many miles of roadway
- c) Rendezvous point availability

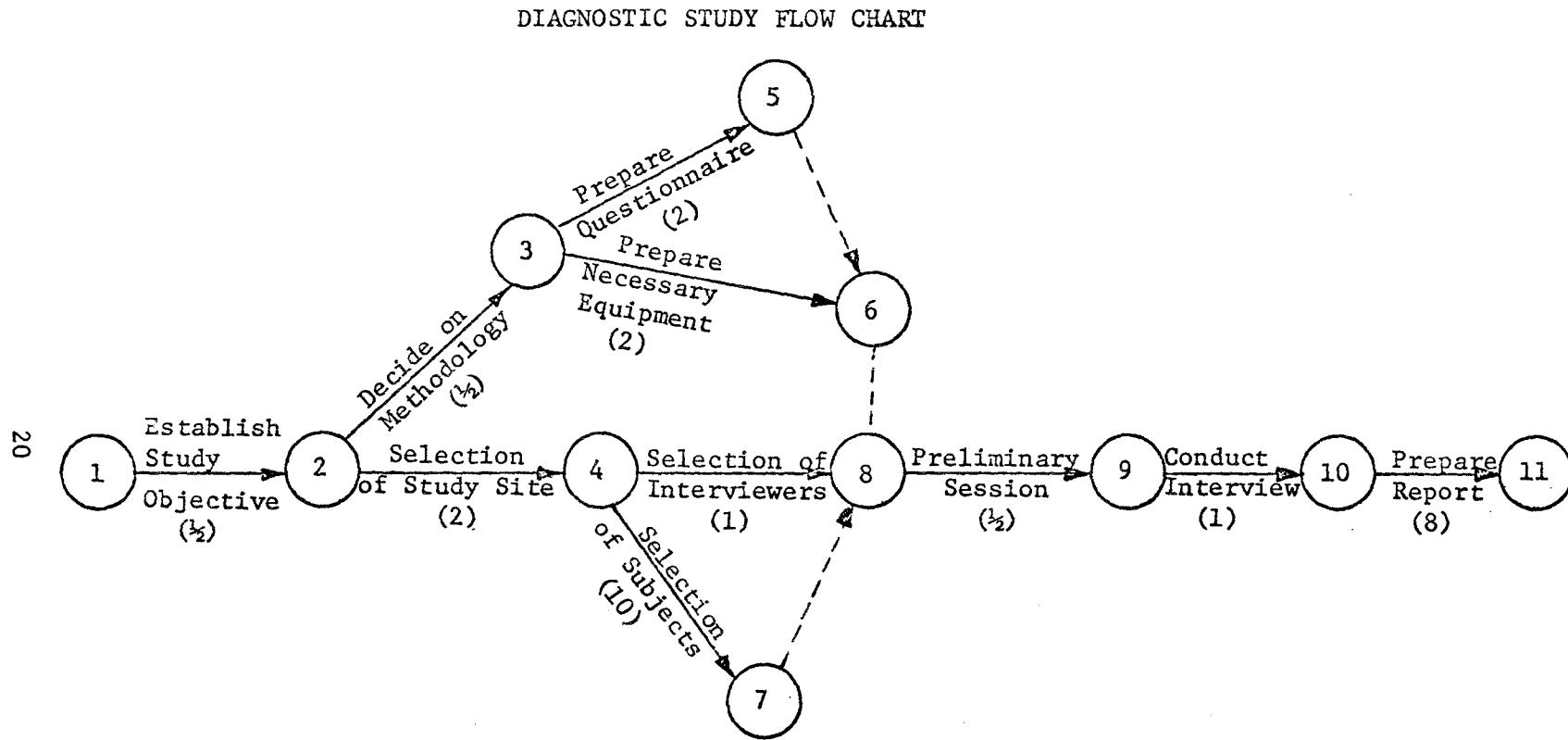
5. Plan Driving Routes

- a) Plan for 20-minute duration
- b) Include turns off and onto site
- c) Avoid long sections of non-activity
- d) Identify probable sources of problems

6. Select Subjects

- a) Extroverts
- b) Quick thinkers
- c) Valid driver's license
- d) Out-of-state driving experience
- e) Profession
 - 1. Enforcement
 - 2. Engineering
 - 3. Lay - men and women

7. Select Interviewers
 - a) Extrovert
 - b) Personable
 - c) Knowledgeable in highway design and traffic control
 - d) Reasonably objective
8. Preliminary Session
 - a) Emphasize safety responsibility of driver
 - b) Present objectives and scope of study
 - c) Review questionnaire
9. The Interview
 - a) Prepare general questions
 - b) Check recording equipment
 - c) Tell subject what is desired from interview
 - d) Start with easy questions
 - e) Do not permit long gap in conversation
10. The Review Session
 - a) Provide comfortable meeting room
 - b) Outline significant comments from interview and organize discussion
 - c) Do not let discussion drag
 - d) Summarize after discussion of each point
11. Data Analysis and Reduction
 - a) Secretarial personnel to prepare literal transcript
 - b) Secretarial personnel to group questionnaire responses
 - c) Engineer to review and edit transcript
 - d) Engineer to group comments
 - e) Engineer to prepare report of study



Time Estimates (X) are in Days With
the Least Unit Assumed of $\frac{1}{2}$ Day.

Assumed:

6 Subjects
Day and Night Studies
Two Vehicles

APPENDIX A

SAMPLE DIAGNOSTIC QUESTIONNAIRES

- A1 - Two-Lane Highways Under Daylight Conditions
- A2 - Two-Lane Highways Under Night Conditions
- A3 - Urban Arterial Streets Under Daylight Conditions
- A4 - Urban Arterial Streets at Night Without Fixed Illumination
- A5 - Urban Arterial Streets at Night With Fixed Illumination
- A6 - Frontage Roads to Freeways Under Daylight Conditions
- A7 - Frontage Roads to Freeways at Night
- A8 - Freeway Sections at Night Without Fixed Illumination
- A9 - Freeway Sections at Night With Fixed Illumination
- A10 - Freeways Under Daylight Conditions

DIAGNOSTIC QUESTIONNAIRE FOR TWO-LANE HIGHWAYS

UNDER DAYLIGHT CONDITIONS

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DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

Occupation _____

POSITION CONTROL

1. Did you, as a driver, lose visual contact with the roadway surface at a distance less than you would desire at any point along the vehicle's projected travel path?

YES

NO

COMMENTS: _____

2. h How would you evaluate the importance of being able to see the roadway surface in the driving task?

OF LITTLE IMPORTANCE

RELATIVELY IMPORTANT

OF SOME IMPORTANCE

CRITICAL PROBLEM

COMMENTS: _____

3. Does the obscured visibility along the roadway create any noticeable degree of erratic behavior on the part of the driver?

YES

NO

COMMENTS: _____

If "Yes", is this the result of trucks or other slow-moving vehicles in the traffic stream?

4. Does the driver appear to have difficulty in maintaining the vehicle within the lane (i.e. does he tend to run off onto the shoulder or over the center line)?

YES

NOT TO ANY MARKED DEGREE

COMMENTS: _____

5. Is the through lane clearly identified from the shoulder?

YES

NO

COMMENTS: _____

If "Yes", how is this accomplished; if "No", how could it best be accomplished?

6. Does there appear to be any substantial amount of traffic running off onto the shoulders?

YES

NO

COMMENTS: _____

7. Would you hesitate to pull off onto the shoulder in wet weather?

YES

NO

COMMENTS: _____

8. Does there appear to be a difference of elevation between the through lane and the shoulder?

YES

NO

COMMENTS: _____

If "Yes", does this apparent discontinuity create a tendency drive nearer the centerline?

9. Do fixed objects (guardrail, sign post, etc.) along the roadside create a tendency to drive nearer the centerline?

YES

NO

COMMENTS: _____

10. Are the roadside hazards removed a sufficient distance from the through lanes to insure reasonable safety?

YES

NO

COMMENTS: _____

If "No", is the hazard visible for a sufficient distance to prevent the driver's being startled by it?

YES

NO

COMMENTS: _____

11. In your opinion, what is the minimum safe distance to a fixed object (guardrail, sign post, etc.) on rural two-lane highways?

feet

COMMENTS: _____

12. Does the width of the through lanes require an excessive amount of driver concentration and thus increase the hazard of driving this section of roadway?

YES

NO

COMMENTS: _____

DIRECTIONAL CONTROL

13. Is there sufficient advance notification of intersecting roadways such that a smooth, natural turning maneuver is possible?

YES

NO

COMMENTS: _____

If "No", how could this best be accomplished?

14. Is the intersecting roadway clearly identified and outlined?

YES

NO

COMMENTS: _____

If "Yes", how is it accomplished; if "No", how could it best be accomplished?

15. Where advisory speeds (safe operating speeds) are posted, are they reasonable in light of the roadway and traffic conditions ahead?

YES

NO

COMMENTS: _____

16. Are the directional sign messages clear and concise so as to minimize the possibility of driver confusion?

YES

NO

COMMENTS: _____

17. Are the directional signs readable at a sufficient distance in advance of the required turn?

YES

NO

COMMENTS: _____

18. Did the trucks in the traffic stream block your view of the roadway ahead?

YES

NO

COMMENTS: _____

OPERATIONAL CONTROL

19. In my opinion, the sight distance to right-of-way control devices (stop signs, yield signs, signals, etc.) is:

ADEQUATE

INADEQUATE

QUESTIONABLE

CRITICAL

COMMENTS: _____

20. Are the control devices located in positions where they are readily apparent to a reasonably alert driver?

YES POSSIBLY POORLY LOCATED

COMMENTS: _____

21. Is there sufficient advance warning of traffic control devices which are not readily apparent?

YES NO

COMMENTS: _____

22. Are the required speed changes accomplished in a manner which minimizes driver alarm and discourages rapid deceleration?

YES NO

COMMENTS: _____

23. Could the sign and/or signal posts be relocated farther from the roadway so as to reduce the associated accident potential and still retain an acceptable degree of effectiveness?

YES POSSIBLY PROBABLY NOT

COMMENTS: _____

24. Where hazard warnings are provided can they easily be associated with the hazard involved?

YES IN SOME CASES NO

COMMENTS: _____

25. Are warnings provided for hazards which are obvious and for which little, if any, warning is actually required?

YES IN A FEW CASES NO

COMMENTS: _____

26. In your opinion, is there a question as to which roadway a right-of-way control device (stop sign, yield sign, signal, etc.) applies?

YES NO

COMMENTS: _____

27. Where a guardrail is used, would you feel just as safe without it (i.e. if you accidentally left the roadway would you just as soon continue down the slope as to be stopped by the guardrail)?

MOST OF THE TIME SELDOM
 SOMETIMES NEVER

COMMENTS: _____

GENERAL INFORMATION

28. Does there appear to be an excessive amount of official informational signing along this section of roadway?

YES POSSIBLE NO

COMMENTS: _____

DIAGNOSTIC QUESTIONNAIRE FOR TWO-LANE RURAL HIGHWAYS AT NIGHT

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DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

POSITION CONTROL

1. Are the intersecting roadways obvious to the reasonably alert driver so that a smooth, natural turn onto them is possible?

YES IN SOME CASES NO

COMMENTS: _____

2. Is the through lane easily distinguishable from the shoulder?

YES NO

COMMENTS: _____

If "Yes", how is it accomplished; if "No", how could it best be accomplished?

3. Are the roadside hazards visible for a sufficient distance to prevent the driver's being startled by them?

YES

NO

COMMENTS: _____

If "Yes", how is this accomplished; if "No", how can it best be accomplished?

4. Is a clear and distinct outline of the roadway ahead provided?

YES

NO

COMMENTS: _____

If "Yes", how is this accomplished; if "No", how can this best be accomplished?

5. Is the light provided by the vehicle's headlights sufficient for safe operation of this facility?

YES

NO

COMMENTS: _____

DIRECTIONAL CONTROL

6. Is there sufficient advance notification of intersecting roadways?

YES

NO

COMMENTS: _____

7. Can the existing directional signs be easily read at a glance?

YES

NO

COMMENTS: _____

8. Are the directional sign messages clear and concise so as to eliminate the possibility of driver confusion?

YES

NO

COMMENTS: _____

OPERATIONAL CONTROL

9. In my opinion, the sight distance to right-of-way control devices (stop signs, yield signs, signals, etc.) at night is?

ADEQUATE

INADEQUATE

QUESTIONABLE

CRITICAL

COMMENTS: _____

10. Where hazard warnings are provided, can they be easily associated with the hazard involved?

YES

NO

COMMENTS: _____

11. Do commercial signs and lights along the roadside attract your attention?

YES

NO

COMMENTS: _____

If "Yes", which signs or lights were of concern to you?

DIAGNOSTIC QUESTIONNAIRE FOR URBAN ARTERIAL STREETS

UNDER DAYLIGHT CONDITIONS

HPR-2(108)

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

Occupation _____

POSITION CONTROL

1. Did you, as a driver, lose visual contact with the roadway surface at a distance less than you would desire at any point along the vehicle's projected travel path?

YES

NO

COMMENTS: _____

What treatment, if any, would you recommend to improve this situation?

2. How would you evaluate the importance of being able to continuously see the roadway surface while driving?

OF LITTLE IMPORTANCE

RELATIVELY IMPORTANT

OF SOME IMPORTANCE

CRITICAL PROBLEM

COMMENTS: _____

3. Do you, as a driver, feel that the turn lanes are obvious in time for a reasonably alert driver to make a smooth, natural maneuver into them?

YES

NO

COMMENTS: _____

4. Does the driver appear to have difficulty in maintaining the vehicle within the marked lane (i.e. does he tend to move over into adjacent lanes)?

YES

NOT TO ANY APPRECIABLE DEGREE

COMMENTS: _____

5. Are the through lanes clearly identifiable from the parking lane?

YES

NO

COMMENTS: _____

6. Does there appear to be a substantial number of vehicles driving partially in the parking lane?

YES

NO

COMMENTS: _____

7. Are the roadside hazards (bridge abutments, piers, guardrail, sign posts, etc.) removed a sufficient distance from the through lanes to insure reasonable safety?

YES

NO

If "No", are the hazards visible for a sufficient distance to prevent the driver's being startled by it?

YES

NO

COMMENTS: _____

8. What do you feel is a minimum safe distance from the outside edge of the through lane or from the curb to an obstruction? _____ feet

COMMENTS: _____

9. Do the curves require an excessive amount of driver concentration and thus increase the hazard of other objects along the roadway?

YES NO POSSIBLY

COMMENTS: _____

10. Does the development and its associated activities along the roadside distract you to any appreciable degree?

YES NO SOME BUT NOT OF CONCERN

COMMENTS: _____

DIRECTIONAL CONTROL

11. Is there sufficient advance notification of cross streets to permit proper utilization of the turn lanes provided?

YES

NO

COMMENTS: _____

If "Yes", how is it accomplished; if "No", how could it best be accomplished?

12. Where lane assignments are indicated (i.e. a requirement of being in a certain lane to perform a certain maneuver) are the assignments clear and easily understood?

YES

NO

COMMENTS: _____

If "No", please indicate the source of the confusion.

13. Do the existing lane assignments result in an unnecessary lane change (i.e. indicate a change to another lane when both lanes continue in the desired direction)?

YES

NO

COMMENTS: _____

14. Are the turn lanes clearly identified and outlined?

YES

NO

COMMENTS: _____

If "Yes", how are they marked; if "No", how should they be marked?

15. Are the directional sign messages clear and concise so as to minimize the possibility of driver confusion?

YES

NO

COMMENTS: _____

OPERATIONAL CONTROL

16. Are the turn lanes long enough so as to eliminate the need for a substantial speed reduction in the through traffic lanes?

ALWAYS USUALLY ON OCCASION SELDOM

COMMENTS: _____

17. Are the right-of-way control devices (i.e. stop signs, yield signs, and signals) located in positions where they are readily apparent to a reasonably alert driver?

YES POSSIBLY POORLY LOCATED

COMMENTS: _____

18. Is there sufficient advance warning of traffic control devices which are not readily apparent?

YES

NO

COMMENTS: _____

If "No", how could this best be accomplished?

19. Where hazard warnings are provided, can they easily be associated with the hazard involved?

YES IN SOME CASES NO

COMMENTS: _____

20. Are warnings provided for hazards which are obvious and for which little if any warning is actually required?

YES IN A FEW CASES NO

COMMENTS: _____

21. In your opinion, is there a question as to which traffic stream a stop sign, yield sign, or signal applies?

YES

NO

If "Yes", which device and where is it located?

22. Did you, as a driver, have difficulty in seeing the traffic lights?

YES SOMETIMES NO

COMMENTS: _____

23. Do commercial signs along the roadway make traffic signs or signals difficult to see?

YES NO

COMMENTS: _____

24. Do the curb radii at the intersections permit smooth turns from the right into the right lane of the cross street?

YES NO

COMMENTS: _____

25. Do the driveways create an uncomfortable feeling while driving this section?

YES NO

COMMENTS: _____

26. Do commercial trucks block the view of the roadway ahead to a noticeable degree?

YES NO

COMMENTS: _____

DIAGNOSTIC QUESTIONNAIRE FOR URBAN ARTERIAL STREETS AT NIGHT

WITHOUT CONTINUOUS FIXED ILLUMINATION

HPR-2(108)

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

POSITION CONTROL

1. Are the turn lanes obvious to a reasonably alert driver so that a smooth, natural maneuver to the turn lanes is possible?

YES

NO

COMMENTS: _____

2. Are the through lanes easily distinguishable from the parking areas where parking is permitted?

YES

NO

COMMENTS: _____

3. Are the roadside hazards visible for a sufficient distance to prevent the driver's being startled by them?

YES

NO

COMMENTS: _____

4. Is a clear and distinct outline of the roadway ahead provided?

YES

NO

COMMENTS: _____

5. Is the light provided by the vehicle's headlights sufficient for safe operation on this facility?

YES

NO

COMMENTS: _____

6. Does the glare from opposing headlights obscure your view of the roadway ahead?

PROBABLY POSSIBLY NOT TO ANY MARKED DEGREE

COMMENTS: _____

DIRECTIONAL CONTROL

7. Is there sufficient advance notification for the turn lanes?

YES

NO

COMMENTS: _____

8. Is there a tendency for a driver to become trapped in a turning lane?

YES

NO

(Space for comments provided on next page)

8. COMMENTS: _____

9. Can the street name signs on major streets be easily read at a glance?

YES

NO

COMMENTS: _____

10. Where directional signing is provided can it be easily read and understood at a glance?

YES

NO

POSSIBLY

DOUBTFUL

COMMENTS: _____

11. Are the driving lanes clearly marked?

YES

NO

COMMENTS: _____

12. Does the glare from opposing headlights make it difficult to read the traffic signs?

DEFINITELY

TO SOME DEGREE

NO

COMMENTS: _____

OPERATIONAL CONTROL

13. Where hazard warnings are provided, can they be easily associated with the hazard involved?

YES

NO

COMMENTS: _____

14. Does the width of the lane create a noticeable degree of tension while driving this section?

YES

NO

COMMENTS: _____

15. While driving the righthand lane, does the parking along the curb or, where parking is prohibited, the height of the curb create a noticeable degree of tension?

YES

SOME

NO

COMMENTS: _____

16. Do commercial signs and lights for roadside businesses attract your attention?

YES

NO

COMMENTS: _____

If "Yes", which signs or lights were most noticeable to you?

17. In my opinion, the sight distance to right-of-way control devices (stop signs, signals, etc.) is:

ADEQUATE

QUESTIONABLE

INADEQUATE

CRITICAL

COMMENTS: _____

DIAGNOSTIC QUESTIONNAIRE FOR URBAN ARTERIAL STREETS AT NIGHT

WITH CONTINUOUS FIXED ILLUMINATION

HPR-2(108)

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

POSITION CONTROL

1. Are the turn lanes obvious to the reasonably alert driver so that a smooth, natural maneuver to the turn lane is possible?

YES

NO

COMMENTS: _____

2. The existing lighting provides a view of the road which is:

ABOUT THE SAME AS DAYLIGHT CONDITIONS

SOMEWHAT LESS THAN DAYLIGHT CONDITIONS BUT
ADEQUATE TO DISCERN THE VARIOUS ROADWAY ELEMENTS

ADEQUATE TO ILLUMINATE THE THROUGH LANES AND
TURN LANES BUT THE INTERSECTIONS ARE NOT AS
VISIBLE AS THEY SHOULD BE

INADEQUATE FOR SAFE DRIVING

COMMENTS: _____

3. Does the glare from opposing headlights and/or the roadway lighting tend to obscure the driver's view of the roadway ahead?

PROBABLY POSSIBLE NOT TO ANY MARKED DEGREE

COMMENTS: _____

DIRECTIONAL CONTROL

4. Does the location of the roadway signs, with respect to the street lights, make them difficult to read at a glance?

YES IN SOME CASES NO

COMMENTS: _____

5. In your opinion, would varying the color of lights at the intersections assist in identifying them?

YES POSSIBLY NO

COMMENTS: _____

6. Where directional signing is provided can it be easily read and understood at a glance?

YES POSSIBLY DOUBTFUL NO

COMMENTS: _____

7. Are the driving lanes clearly identified?

YES

NO

COMMENTS: _____

8. Does the glare from opposing headlights make it difficult to read the traffic signs?

DEFINITELY TO SOME DEGREE NO

COMMENTS: _____

9. Is there sufficient advance notification for the turn lanes?

YES NO

COMMENTS: _____

10. Do the turn lanes tend to trap the driver (i.e. is there a tendency for a driver to become trapped in a turning lane)?

YES NO

COMMENTS: _____

11. Can the street name signs on major streets be easily read at a glance?

YES NO

COMMENTS: _____

OPERATIONAL CONTROL

12. In my opinion, the sight distance to the right-of-way control devices (stop signs, signals, etc.) with the existing lighting is?

ADEQUATE

QUESTIONABLE

INADEQUATE

CRITICAL

COMMENTS: _____

13. Where hazard warnings are provided, can they be easily associated with the hazard involved?

YES

NO

COMMENTS: _____

14. Do commercial signs and lights along the street detract to a marked degree from the effectiveness of traffic control devices (signs, signals, etc.)?

YES POSSIBLY NO

COMMENTS: _____

DIAGNOSTIC QUESTIONNAIRE FOR FRONTAGE ROADS TO FREEWAYS

UNDER DAYLIGHT CONDITIONS

HPR-2(108)

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

Occupation _____

POSITION CONTROL

1. Did you, as a driver, lose visual contact with the roadway surface at a distance less than you would desire at any point along the vehicle's projected travel path?

YES

NO

COMMENTS: _____

2. Do the curves require an excessive amount of driver concentration and thus increase the hazard of other objects along the roadway?

YES

NO

POSSIBLY

COMMENTS: _____

3. Does the development and the associated activities along the roadside distract you to any appreciable degree?

YES NO SOME BUT NOT OF CONCERN

COMMENTS: _____

DIRECTIONAL CONTROL

4. Is there sufficient advance notification of cross streets to permit proper utilization of the turn lanes provided?

YES NO

COMMENTS: _____

5. Where lane assignments are indicated (i.e. a requirement to be in a certain lane to perform a certain maneuver) are the assignments clear and easily understood?

YES NO

COMMENTS: _____

6. Are the directional sign messages clear and concise so as to minimize the possibility of driver confusion?

YES NO

COMMENTS: _____

OPERATIONAL CONTROL

7. Are the entrance ramps to the freeway easy to locate?

YES

NO

COMMENTS: _____

8. Are the exit ramp intersections with the frontage road unduly hazardous?

YES

NO

COMMENTS: _____

9. Is it always apparent whether the frontage roads are one-way or two-way?

YES

NO

COMMENTS: _____

10. Are the right-of-way control devices (i.e. stop signs, yield signs, signals, etc.) located in position where they are readily apparent to a reasonably alert driver?

YES POSSIBLY POORLY LOCATED

COMMENTS: _____

11. Is there sufficient advance warning of traffic control devices which are not readily apparent?

YES

NO

(Space for comments provided on the next page)

11. COMMENTS: _____

If "no", how could this best be accomplished?

12. In your opinion, is there a question as to which traffic stream, a stop sign, yield sign or signal applies?

YES NO

If "Yes", which device and where is it located?

COMMENTS: _____

13. Did you, as a driver, have difficulty seeing the traffic signals?

YES SOMETIMES NO

COMMENTS: _____

14. Do commercial signs along the roadway make traffic signs or signals difficult to see?

YES NO

COMMENTS: _____

15. Do the curb radii at the intersection permit smooth turns from the right lane into the right lane of the cross street?

YES

NO

COMMENTS: _____

16. Do the driveways create an uncomfortable feeling while driving this section?

YES

NO

COMMENTS: _____

GENERAL INFORMATION

17. Does there appear to be an excessive amount of official informational signing along this section of frontage road?

YES

NO

COMMENTS: _____

18. In my opinion, the roadside advertising competes with the official highway signing and signalization for the driver's attention to:

A MARKED DEGREE

A LIMITED DEGREE

SOME DEGREE

A VERY LIMITED DEGREE,
IF AT ALL

COMMENTS: _____

DIAGNOSTIC QUESTIONNAIRE FOR FRONTAGE ROADS TO FREEWAYS AT NIGHT

HPR-2(108)

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

POSITION CONTROL

1. Are the turn lanes obvious to a reasonably alert driver so that a smooth, natural maneuver to the turn lanes is possible?

YES

NO

COMMENTS: _____

2. Are the through lanes easily distinguishable from the parking areas, where parking is permitted?

YES

NO

COMMENTS: _____

3. Are the roadside hazards visible from a sufficient distance to prevent the driver's being startled by them?

YES

NO

3. COMMENTS: _____

4. Is a clear and distinct outline of the roadway ahead provided?

YES

NO

COMMENTS: _____

5. Is the light provided by the vehicle's headlights sufficient for safe operation on this facility?

YES

NO

COMMENTS: _____

DIRECTIONAL CONTROL

6. Do the turn lanes tend to trap the driver?

YES

NO

COMMENTS: _____

7. Where directional signing is provided can it be easily read and understood at a glance?

YES

POSSIBLY

DOUBTFUL

NO

COMMENTS: _____

8. Would advance street name signs be of value in driving on this frontage road?

YES

NO

COMMENTS: _____

9. Are the driving lanes clearly marked?

YES

NO

COMMENTS: _____

OPERATIONAL CONTROL

10. In my opinion, the sight distances to the right-of-way control devices (stop signs, signals, etc.) are:

ADEQUATE

QUESTIONABLE

INADEQUATE

CRITICAL

COMMENTS: _____

11. Where hazard warnings are provided, can they be easily associated with the hazard involved?

YES

NO

COMMENTS: _____

12. Do commercial signs and lights along the street detract to a marked degree from the effectiveness of traffic control devices (signs, signals, etc.)?

YES POSSIBLY NO

COMMENTS: _____

If "Yes", which signs or lights were of concern to you?

13. Is it always apparent whether the frontage road is one-way or two-way?

YES NO

COMMENTS: _____

DIAGNOSTIC QUESTIONNAIRE FOR FREEWAY SECTIONS AT NIGHT WITHOUT FIXED
ILLUMINATION

HPR-2(108)

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

POSITION CONTROL

1. Are the exit ramps obvious to the reasonably alert driver in time to make a smooth, natural maneuver to the ramp?

YES

NO

COMMENTS : _____

2. Are the through lanes easily distinguishable from the shoulder?

YES

NO

COMMENTS : _____

If "No", how should this problem be corrected?

COMMENTS : _____

3. Are the roadside hazards visible for a sufficient distance to prevent the driver's being startled by them?

YES

NO

COMMENTS: _____

4. Is a clear and distinct outline of the roadway ahead provided?

YES

NO

COMMENTS: _____

5. Is the light provided by the vehicle's headlights sufficient for safe operation on this roadway?

YES

NO

COMMENTS: _____

6. Does the glare from opposing headlights obscure the driver's view of the roadway ahead?

PROBABLY POSSIBLY NOT TO ANY MARKED DEGREE

COMMENTS: _____

DIRECTIONAL CONTROL

7. Is there sufficient advance signing for the exit ramps?

YES

NO

(Space for comment has been provided on the next page)

7. COMMENTS: _____

8. Can the existing directional signs be easily read at a glance?

YES

NO

COMMENTS: _____

9. Are the lanes clearly marked?

YES

NO

COMMENTS: _____

10. Does the glare from opposing headlights make it difficult to read roadside and/or overhead signs?

YES

NO

COMMENTS: _____

OPERATIONAL CONTROL

11. Where hazard warnings are provided, can they be easily associated with the hazard involved?

YES

NO

COMMENTS: _____

12. Do commercial signs and lights along this freeway distract you to any appreciable degree?

YES POSSIBLE NO

COMMENTS: _____

If "Yes", which signs or lights were of the greatest concern to you?

COMMENTS: _____

DIAGNOSTIC QUESTIONNAIRE FOR FREEWAY SECTIONS AT NIGHT WITH FIXED ILLUMINATION

HPR-2(108)

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

POSITION CONTROL

1. Are the ramps obvious, to the reasonably alert driver, at a sufficient distance in advance of the necessary maneuver such that a smooth, natural maneuver to the ramp is possible?

YES

NO

COMMENTS: _____

2. The existing lighting provides a view of the road which is?

ABOUT THE SAME AS DAYLIGHT CONDITIONS

SOMEWHAT LESS THAN DAYLIGHT CONDITIONS BUT ADEQUATE TO DISCERN THE VARIOUS FEATURES OF THE ROADWAY

ADEQUATE TO LIGHT THE THROUGH LANES BUT THE RAMPS ARE NOT AS VISIBLE AS THEY SHOULD BE

INADEQUATE FOR SAFE DRIVING

COMMENTS: _____

3. Do the pavement markings (lane lines) show up well at night?

YES

NO

COMMENTS: _____

4. Does the glare from opposing headlights and/or the roadway lighting tend to obscure the driver's view of the roadway ahead?

YES

NO

COMMENTS: _____

5. Does the lighting eliminate the need for special roadway delineation (i.e. roadside reflectors, pavement edge lines, etc.) on the through lanes?

YES

POSSIBLY

NO

COMMENTS: _____

On the ramps?

YES

POSSIBLY

NO

COMMENTS: _____

DIRECTIONAL CONTROL

6. Does the location of the roadway signs with respect to the lights make them difficult to read at a glance?

YES

IN SOME CASES

NO

(Space for comments provided on the next page)

6. COMMENTS: _____

7. In your opinion, would varying the color of the lights (i.e. use yellow rather than blue-white) on exit and entrance ramps assist in identifying these areas?

YES POSSIBLY NO

COMMENTS: _____

8. In your opinion, would the use of colored edge lines (say blue for off-ramps and yellow for on-ramps or some similar combination) assist in the delineation of the ramps?

YES POSSIBLE NO

COMMENTS: _____

OPERATIONAL CONTROL

9. Where hazard warnings are provided, can they be easily associated with the hazard involved?

YES NO

COMMENTS: _____

10. Do commercial signs and lights along this freeway distract you to any appreciable degree?

YES POSSIBLE NO

(Space for comments has been provided on the next page)

10. COMMENTS: _____

If "Yes", which sign or light was of the greatest concern to you?

COMMENTS: _____

DIAGNOSTIC QUESTIONNAIRE FOR FREEWAYS UNDER DAYLIGHT CONDITIONS

HPR-2(108)

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATIONS SYSTEMS

Study Site Number _____

Location _____

Name of Team Member _____

Occupation _____

POSITION CONTROL

1. Did you, as a driver, lose visual contact with the roadway surface at a distance less than you would desire at any point along the vehicle's projected travel path?

YES

NO

COMMENTS: _____

What treatment, if any, would you recommend to improve this situation?

2. How would you evaluate the importance of being able to continuously see the roadway surface while driving?

OF LITTLE IMPORTANCE

RELATIVELY IMPORTANT

OF SOME IMPORTANCE

CRITICAL PROBLEM

COMMENTS: _____

3. Do you, as a driver, feel that the ramps and direct connecting roadways are obvious in time for a reasonably alert driver to make a smooth, natural maneuver to them?

YES

NO

COMMENTS: _____

4. Did the lack of visibility of the roadway surface create any noticeable degree of erratic behavior (slowing substantially, drift into other lane, etc.) on the part of driver when you were the observer?

YES

NO

COMMENTS: _____

5. Does the driver appear to have difficulty in maintaining the vehicle within the marked lane (i.e. does he tend to move over into adjacent lanes)?

YES

NOT TO ANY APPRECIABLE DEGREE

COMMENTS: _____

- 6.i Are the through lanes clearly identifiable from the emergency parking areas (shoulders)?

YES

NO

If "Yes", how was this accomplished; if "No", how would you suggest that it be accomplished?

COMMENTS: _____

7. Does there appear to be a substantial number of vehicles driving in the emergency parking areas?

YES

NO

COMMENTS: _____

8. Are the roadside hazards (bridge abutments, piers, guardrail, sign posts, etc.) removed a sufficient distance from the through lanes to insure reasonable safety?

YES

NO

COMMENTS: _____

If "No", are the hazards visible for a sufficient distance to prevent the driver being startled by them?

YES

NO

COMMENTS: _____

9. What do you feel is a minimum safe distance from the outside edge of the through lane to an obstruction? _____ feet

COMMENTS: _____

10. Do the curves require an excessive amount of driver concentration thus increasing the hazard of other objects along the roadway?

YES NO POSSIBLY

(Space for comments provided on the next page)

10. COMMENTS: _____

DIRECTIONAL CONTROL

11. Is there sufficient advance notification for the exit ramps and direct connecting roadways under light to moderate traffic conditions?

YES NO

COMMENTS: _____

12. Is there sufficient advance notification of exit ramps and direct connecting roadways under heavy traffic conditions (i.e. limited lane change capability)?

YES NO PROBABLY

COMMENTS: _____

13. Where lane assignments are indicated (i.e. a requirement to be in a certain lane), are the assignments clear and easily understood?

YES NO

COMMENTS: _____

If "No", please indicate the source of the confusion.

14. Do the existing lane assignments result in an unnecessary lane change (i.e. indicate a change to another lane when both lanes continue in the desired direction)?

YES

NO

COMMENTS: _____

15. Are the exit ramps clearly identified and outlined?

YES

NO

COMMENTS: _____

If "No", how should they be marked; if "Yes", how are they marked?

16. When advisory speeds (safe speeds) are posted, are they reasonable in light of the roadway and traffic conditions ahead?

YES

NO

COMMENTS: _____

17. Are the directional sign messages clear and concise so as to minimize the possibility of driver confusion?

YES

NO

COMMENTS: _____

OPERATIONAL CONTROL

18. Are adequate speed change areas (acceleration and deceleration lanes) provided so as to eliminate the need for a substantial speed reduction in the through traffic lanes?

ALWAYS USUALLY ON OCCASION SELDOM

COMMENTS: _____

19. Could the signs be moved further from the edge of the roadway so as to reduce the associated accident potential and still retain an acceptable degree of effectiveness?

YES POSSIBLE PROBABLY NOT

COMMENTS: _____

20. Where hazard warnings are provided, can they easily be associated with the hazard involved?

YES IN SOME CASES NO

COMMENTS: _____

21. Are warnings provided for hazards which are obvious and for which little if any warning is actually required?

YES IN A FEW CASES NO

COMMENTS: _____

GENERAL INFORMATION

22. Does there appear to be an excessive amount of official Informational signing (directional signing) along this section of Freeway?

YES POSSIBLE NO

COMMENTS: _____

23. Is the Informational signing provided of real value to a majority of the traffic?

YES POSSIBLY NO

COMMENTS: _____

24. In my opinion, the roadside advertising in this section competes with the official highway signing for the driver's attention to:

A MARKED DEGREE

A LIMITED DEGREE

SOME DEGREE

A VERY LIMITED DEGREE,
IF AT ALL

COMMENTS: _____

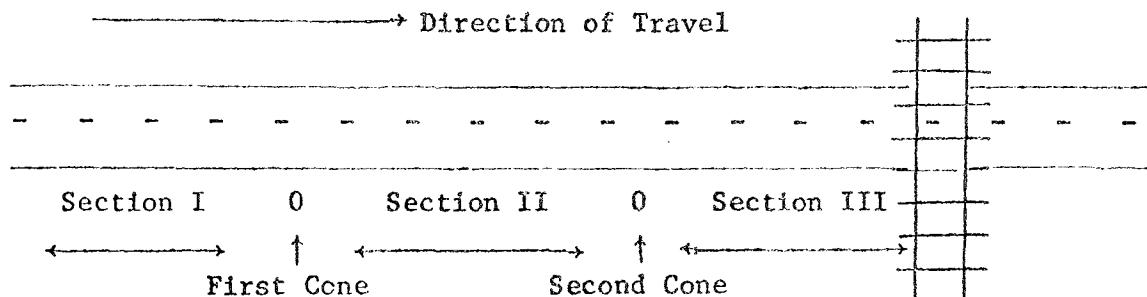
APPENDIX B

**SAMPLE DIAGNOSTIC QUESTIONNAIRE RAILROAD
GRADE CROSSING SAFETY EVALUATION**

Study Crossing No. _____ Date _____

Rail-Highway Grade Crossing Safety Evaluation
Diagnostic Study Questionnaire

The purpose of the diagnostic team study is to determine the conditions at crossings which affect safety. This questionnaire is intended to provide an evaluation of conditions at each study crossing. The questionnaire is divided into three parts: one for each approach, and one on the crossing in general. Parts A & B which apply to the crossing approaches are further divided into sections in which driver requirements vary. A more detailed explanation is given at the beginning of each section, which is illustrated in the sketch below.



The first cone is placed at the point where the driver must begin making his decision of whether or not he may safely proceed over the crossing. The second cone is placed where the driver must begin applying his brakes if he is to stop short of the crossing. Both measurements are based on the maximum legal or practical speed and stopping distance on wet pavements.

Part A _____ Bound Approach

Section I. The questions in this section are concerned with whether or not the normal driver would become aware of the crossing's presence. This awareness must be accomplished prior to reaching the first traffic cone so the driver will be prepared to begin making his decision. Observations for questions in this section should be made in the area of roadway prior to arriving at the first traffic cone. At this point we are not concerned with whether or not a train is approaching except for activated protective devices which should be assumed are in operation.

1. Do you feel most drivers would be aware of the crossing?

Yes

No

2. Do you think the crossing would be noticed by most drivers under nighttime conditions?

Yes

No

3. What features or conditions contributed to your answer in questions 1 and 2?

4. Which of the answers below most nearly describe the visibility of the signs or signals at the crossing?

should be obvious at all times

should be obvious when activated

is in the driver's field of view

can be seen if looked for

cannot be seen from this point

5. Do you feel the visibility of the crossing protective device under nighttime conditions would be increased or decreased?

increased

decreased

about the same

6. How would you rate the effectiveness of the advance warning signs and signals?

- maximum effectiveness is achieved
 effective but could be improved further
 ineffective under some conditions
 ineffective at all times
 sign is nonexistent
 marking is nonexistent

Comment: _____

7. Would you expect the driver to not notice the crossing due to his attention to other traffic conditions?

Yes No

Comment: _____

8. Would you expect any existing curves, grades or other geometric features of the roadway to influence the driver's awareness of the crossing?

Yes No

If so, which features? _____

9. Do you feel the driver has been given all the information he needs so he would be aware of the crossing?

Yes No

10. Considering traffic conditions and train frequency, how do you think drivers who pass the crossing several times a week would react to its presence?

more aware of the crossing and more alert for train
 more aware of the crossing but less alert for train
 would pay less attention to the crossing
 tend to disregard crossing altogether

Section II. The questions in this section are concerned with whether or not the driver has sufficient information to make the correct decision. Observations for questions in this section should be made in the area between the two traffic cones. For these questions also it should be assumed that all activated protective devices are in operation

1. Would the presence of a train approaching the crossing be obvious to most drivers?

Yes No

Why? _____

2. Assuming the driver is aware of the crossing's existence, is he totally dependent on the operation of crossing signals to detect a train's presence?

Yes No Not Applicable

3. Do you think your answers to questions 1 and 2 would be changed under nighttime conditions?

Yes No

Comment: _____

4. At what distance do you estimate that a train approaching from the most obstructed side would be observed by the average driver?

less than 100 feet
 100 feet to 300 feet
 300 feet to 500 feet
 500 feet to 1000 feet
 over 1000 feet

5. Do you feel the driver could safely make his decision if one of the signs or signals at the crossing was knocked down or was not otherwise visible?

Yes No Would not affect decision

6. Could the presence or absence of a legally parked vehicle affect the driver's decision process?

Yes No

If so, how? _____

7. Would the roadway geometrics or other traffic require the driver's attention to the extent that it would impair or delay his decision process?

Yes No

If so, explain: _____

8. If this approach involves a near side spur or siding, how do you feel standing railroad cars on the near track would affect the driver's decision?

9. If you feel the driver could not make a correct decision because of visibility restrictions, what would be necessary to provide adequate sight distance?

Would this involve a serious imposition on the property owners?

Yes No

10. Under optimum conditions, does the driver have sufficient information available to make his stop or go decision?

Yes No

11. Do you think most drivers will be aware of and make proper interpretation of the information if it is available?

Yes No

If not, why? _____

12. Would you feel safe in making a stop or go decision in the area bounded by the two traffic cones while approaching at the legal or practical speed?

Yes No

If not, at what speed would you feel safe in approaching the crossing?

Section III. The questions in this category apply to observations in the section of roadway adjacent to the crossing. Traffic using any adjacent streets or driveways should be observed briefly to determine if any traffic not passing the crossing could affect traffic on the crossing.

1. If it should be necessary for the driver to stop for a train, is the point at which he should stop clearly indicated?

Yes

No

Comment: _____

2. Do you feel conditions are conducive for a vehicle to become stalled on the crossing?

Yes

No

Comment: _____

3. Do you think that other traffic conditions or controls could contribute to a vehicle stopping on the crossing?

Yes

No

If yes, explain: _____

4. Would a vehicle which is required by law to stop at crossings present a hazard to other vehicles?

Yes

No

Why? _____

5. Do you think the signs and/or signals related to the crossing present a potential hazard in themselves?

Yes

No

Why? _____

6. If a driver is unable to stop before striking a train, is there sufficient opportunity for evasive action?

Yes

No

Comment: _____

Part B _____ Bound Approach

Section I. The questions in this section are concerned with whether or not the normal driver would become aware of the crossing's presence. This awareness must be accomplished prior to reaching the first traffic cone so the driver will be prepared to begin making his decision. Observations for questions in this section should be made in the area of roadway prior to arriving at the first traffic cone. At this point we are not concerned with whether or not a train is approaching except for activated protective devices which should be assumed are in operation.

1. Do you feel most drivers would be aware of the crossing?

Yes

No

2. Do you think the crossing would be noticed by most drivers under nighttime conditions?

Yes

No

3. What features or conditions contributed to your answer in questions 1 and 2?

4. Which of the answers below most nearly describe the visibility of the signs or signals at the crossing?

should be obvious at all times
 should be obvious when activated
 is in the driver's field of view
 can be seen if looked for
 cannot be seen from this point

5. Do you feel the visibility of the crossing protective device under nighttime conditions would be increased or decreased?

increased
 decreased
 about the same

6. How would you rate the effectiveness of the advance warning signs and markings?

maximum effectiveness is achieved
 effective but could be improved further
 ineffective under some conditions
 ineffective at all times
 sign is nonexistant
 marking is nonexistant

Comment: _____

7. Would you expect the driver to not notice the crossing due to his attention to other traffic conditions?

Yes No

Comment: _____

8. Would you expect any existing curves, grades or other geometric features of the roadway to influence the driver's awareness of the crossing?

Yes No

If so, which features? _____

9. Do you feel the driver has been given all the information he needs so he would be aware of the crossing?

Yes No

10. Considering traffic conditions and train frequency, how do you think drivers who pass the crossing several times a week would react to its presence?

- more aware of the crossing and more alert for train
 more aware of the crossing but less alert for train
 would pay less attention to the crossing
 tend to disregard crossing altogether.

Section II. The questions in this section are concerned with whether or not the driver has sufficient information to make the correct decision. Observations for questions in this section should be made in the area between the two traffic cones. For these questions also it should be assumed that all activated protective devices are in operation.

1. Would the presence of a train approaching the crossing be obvious to most drivers?

Yes

No

Why? _____

2. Assuming the driver is aware of the crossing's existence, is he totally dependent on the operation of crossing signals to detect a train's presence?

Yes

No

Not Applicable

3. Do you think your answers to questions 1 and 2 would be changed under nighttime conditions?

Yes

No

Comment: _____

4. At what distance do you estimate that a train approaching from the most obstructed side would be observed by the average driver?

less than 100 feet

100 feet to 300 feet

300 feet to 500 feet

500 feet to 1000 feet

over 1000 feet

5. Do you feel the driver could safely make his decision if one of the signs or signals at the crossing was knocked down or was not otherwise visible?

Yes No Would not affect decision

6. Could the presence or absence of a legally parked vehicle affect the driver's decision process?

Yes No

If so, how? _____

7. Would the roadway geometrics or other traffic require the driver's attention to the extent that it would impair or delay his decision process?

Yes No

If so, explain: _____

8. If this approach involves a near side spur or siding, how do you feel standing railroad cars on the near track would affect the driver's decision?

9. If you feel the driver could not make a correct decision because of visibility restrictions, what would be necessary to provide adequate sight distance?

Would this involve a serious imposition on the property owners?

Yes

No

10. Under optimum conditions, does the driver have sufficient information available to make his stop or go decision?

Yes

No

11. Do you think most drivers will be aware of and make proper interpretation of the information if it is available?

Yes

No

If not, why? _____

12. Would you feel safe in making a stop or go decision in the area bounded by the two traffic cones while approaching at the legal or practical speed?

Yes

No

If not, at what speed would you feel safe in approaching the crossing?

Section III. The questions in this category apply to observations in the section of roadway adjacent to the crossing. Traffic using any adjacent streets or driveways should be observed briefly to determine if any traffic not passing the crossing could affect traffic on the crossing.

1. If it should be necessary for the driver to stop for a train,

is the point at which he should stop clearly indicated?

Yes

No

Comment: _____

2. Do you feel conditions are conducive for a vehicle to become stalled on the crossing?

Yes

No

Comment: _____

3. Do you think that other traffic conditions or controls could contribute to a vehicle stopping on the crossing?

Yes

No

If yes, explain: _____

4. Would a vehicle which is required by law to stop at crossings present a hazard to other vehicles?

Yes

No

Why? _____

5. Do you think the signs and/or signals related to the crossing present a potential hazard in themselves?

Yes

No

Why? _____

- _____
- _____
- _____
6. If a driver is unable to stop before striking a train, is there sufficient opportunity for evasive action?

Yes

No

Comment: _____

Part C General

Section I. The questions in this category concern general observations and do not concern any particular section of roadway.

1. List the major features or conditions at this crossing which you feel contribute most to safety in the order of their importance.

2. List the major features or conditions at this crossing which you feel contribute to reducing crossing safety in the order of their importance.

3. Could the safety of the crossing be increased by minor changes in roadway geometry?

Yes

No

If so, explain: _____

4. Do you think major changes in roadway geometrics (including grade separations) are necessary to provide minimum acceptable safety conditions?

Yes

No

If so, explain: _____

5. Would additional illumination of the crossing increase the safety?

Yes

No

Comment: _____

6. Do you think additional traffic controls (either railroad or highway) are necessary to provide adequate crossing safety?

Yes

No

If so, explain: _____

7. What is your evaluation of this crossing from a safety standpoint as it now exists?

8. List any factors that would affect the safety of this crossing that are not covered by this questionnaire.

9. Please list any changes or additions to this questionnaire or procedure that would improve the study of other crossings.

Please Print Your Name _____

OPERATION DATA

Study Crossing No. _____

Crossing Code No. _____

Railroad Company _____

Location _____

No. of Trains Per Day _____

Train Speed Limit _____

Type of Track _____

Vehicle Speed Limit _____ bound approach _____ mph

Vehicle Speed Limit _____ bound approach _____ mph

Average Daily Traffic _____